Table 1

Cells

Cell	Receptor
5.25	CXCR4, CD4, CCR5 (not expressed well) BONZO
5.25.Luc4.M7	CD4, CCR5, BONZO
HOS.CD4.CCR5	CD4, CCR5
HOS.CD4.CXCR4	CD4, CXCR4
HOS.CD4	CD4, low level expression of CCR5 and CXCR4
HOS HT4 R5 GFP wt	CD4, CXCR4, CCR5
HOS.CD4.CCR5.GFP.M7#6*	CD4, CXCR4, CCR5
P4.CCR5	CD4, CXCR4, CCR5
U87.CD4	CD4
U87.CD4 R5	CD4, CCR5
U87.CD4 X4	CD4, CXCR4
MT2	CD4, CXCR4
MT4	CD4, CXCR4
PM1	CD4, CXCR4, CCR5
CEM NKr CCR5	CD4, CXCR4, CCR5

Table 2   Representative viruses and reagents

Viruses	Envelope[a]	Source
89.6, SF2	R5-X4/SI/B	ARRRP[B]
92BR014,92US076	R5-X4/SI/B	ARRRP
JR-CSF, 91US005	R5/NSI/B	ARRRP
91US054	SI/B	ARRRP
NL43, MN, ELI	X4/B	ARRRP
92HT599	X4	ARRRP
92UG031	R5/NSI/A	ARRRP(IN-HOUSE)
92TH014, 92TH026	R5/NSI/B	ARRRP(IN-HOUSE)
92BR025, 93MW959	R5/SI/C	ARRRP(IN-HOUSE)
92UG035	R5/NSI/D	ARRRP(IN-HOUSE)
92TH022, 92TH023	R5/NSI/E	ARRRP(IN-HOUSE)
93BR020	R5-X4/SI/F	ARRRP(IN-HOUSE)
Antibodies	**Epitope**	**SOURCE**
Mabs 2F5, 1577	gp41 TM	ARRRP
Mabs IG1b12, 2G12, 17b, 48D	gp120 SU	ARRRP
Neutralization sera #2, HIV-IG	Polyclonal	ARRRP
Entry inhibitors	**Target**	**Source**
CD4-IG	gp120 SU	Genentech
CD4-IGG2	gp120 SU	Adarc
SCD4	Sigma	Progenics
T20 (DP178)	gp41 TM	Trimeris
Rantes, MIP1a/b	CCR5	SIGMA/ARRRP
SDF1a/b	CXCR4	SIGMA/ARRRP
AMD 3100	CXCR4	AnorMed
Dextran sulfate, Heparin	Non-specific	Sigma

[a]R5 (CCR5 co-receptor), X4 (CXCR4 co-receptor)
SI (syncytium inducing), NSI (non-syncytium inducing), A,B,C,D,E,F
(envelope clade designation)
[b]AIDS Research and Reference Reagent Program

Table 3

Primers Tested for the Amplification of HIV Envelope

RT PRIMERS

RT env_N3	5'-GGA GCA TTT ACA AGC AGC AAC ACA GC-3'
RT env 9720	5' -TTC CAG TCA VAC CTC AGG TAC-3'
RT env 9740	5'-AGA CCA ATG ACT TAY AAG G-3'

5' PCR PRIMERS

5'env	5' -GGG CTC GAG ACC GGT CAG TGG CAA TGA GAG TGA AG- 3'
5'env_Xho/Pin	5'-GGG CTC GAG ACC GGT GAG CAG AAG ACA GTG GCA ATG A-3'
5'env_START	5'-GGG CTC GAG ACC GGT GAG CAG AAG ACA GTG GCA ATG -3'

3' PCR PRIMERS

3' env	5' -GGG TCT AGA ACG CGT TGC CAC CCA TCT TAT AGC AA- 3'
3'env_Xba/Mlu	5'-GGG TCT AGA ACG CGT CCA CTT GCC ACC CAT BTT ATA GC-3'
3'env_STOP	5'-GGG TCT AGA ACG CGT CCA CTT GCC ACC CAT BTT A-3'
3' delta CT	5' -GAT GGT CTA AGA CGC TGT TCA ATA TCC CTG CCT AAC TC- 3'

All Experiments are located in Virologic Book number 0188

Table 4 (Panel 1)

Anti-HIV Drugs

Drug/Compound	Generic Name	Trademark	Manufacturer
RT Inhibitors (NRTI, nucleotide analogs)			
AZT, ZDV	Zidovudine	Retrovir	Glaxo/Wellcome
3TC	Lamivudine	Epivir	Glaxo/Wellcome
AZT + 3TC		Combivir	Glaxo/Wellcome
d4T	Stavudine	Zerit	Bristol-Myers/Squibb
ddI	Didanosine	Videx	Bristol-Myers/Squibb
ddC	Zalcitabine	Hivid	Hoffman La Roche
1592U89	Abacavir	Ziagen	Glaxo/Wellcome
AZT + 3TC + 1592U89		Trizivir	Glaxo/Wellcome
(-)FTC (5-fluoro-3TC; Corviracil)	Emtricitabine		Triangle Pharmaceuticals
(-)FTC + (+)FTC (50:50)	Racimir		QuadPharma
DAPD (DXG active)	Amdoxovir		Triangle Pharmaceuticals
F-ddA (2-fluoro-ddA)	Lodenosine		MedImmune Oncology (US Bioscience)
BCH-10652, dOTC (2-deoxy-3-oxa-4-thiocytidine)			BioChem Pharma, Inc.
D-d4FC			Triangle Pharmaceuticals (Schinazi)
RT Inhibitors (NTRTI, nucleotide analogs)			
bis-POC PMPA (GS-4331)	Tenofovir		Gilead Sciences
bis-POM PMEA (GS-840)	Adefovir dipivoxil		Gilead Sciences
RT Inhibitors (NNRTI, non-nucleosides)			
BI-RG-587	Nevirapine	Viramune	Boehringer/Ingleheim (Roxanne)
BHAP PNU-90152T	Delavirdine	Rescriptor	Pharmacia & Upjohn
DMP 266 (L-743,726)	Efavirenz	Sustiva	Dupont Pharmaceuticals (Avid)
MKC442 (Coactinon)	Emivirine		Triangle/Mitsubishi Kasei
AG-1549 (S1153) (on hold)	Capravirine		Agouron Pharmaceuticals
PNU-142721			Pharmacia & Upjohn
DPC-961, -963, -083, -08?			DuPont Pharmaceuticals
SJ-3366	Also entry inhibitor?		Samjin Pharmaceuticals
BHAP PNU-87201	Atevirdine		Upjohn
GW420867X (quinoxaline)	(2nd gen. HBY 097)		Glaxo/Wellcome (Hoechst Bayer)
TMC 120 (R147681)			Tibotec
TMC 125 (R165335)			Tibotec
R86183	tivirapine		Janssen Pharmaceuticals
Calanolide A			Sarawak Medichem Pharmaceuticals
Protease Inhibitors (PRI)			
Ro 31-8959	Saquinavir-(hgc) Saquinavir-(sgc)	Invirase Fortivase	Hoffman-La Roche
MK-639 (L-735,524)	Indinavir	Crixivan	Merck Research Laboratories
ABT-538 (A-84538)	Ritonavir	Norvir	Abbott Laboratories
AG1343	Nelfinavir	Viracept	Agouron Pharmaceuticals
141W94 (VX-478)	Amprenavir	Agenerase	Glaxo-Wellcome/Vertex
ABT-378/r	Lopinavir/ritonavir	Kaletra	Abbott Laboratories
BMS 232,632 (aza-peptide)			Bristol-Myers-Squibb
PNU-140690	Tipranavir		Pharmacia & Upjohn
DMP 450 (cyclic urea)	Mozenavir		Triangle/Avid (ph I/II)
TMC 126 (Erickson's compound)			Tibotec
G/W433908 (VX-175)	amprenavir pro-drug		Glaxo/Wellcome/Vertex
L756,423 (on hold)			Merck
PD-178390 (dihydropyrone)			Parke Davis (Boehringer-Ingleheim)
? new candidate			Roche
DPC 681 and 684			DuPont Pharmaceuticals
AG-1776 (JE-2147 = KNI-764)			Agouron Pharmaceuticals
Envelope/Receptor Inhibitors			
T-20 (gp41)	Pentafuside		Trimeris Pharmaceuticals
T-1249 (gp41)			Trimeris Pharmaceuticals
D-peptide inhibitor (gp41) small mol.	SCH-C		Schering-Plough
AMD-3100 (CXCR4)	(bicyclam)		AnorMED
AMD-8664 (CXCR4)	(macrocyclam)		AnorMED
ALX40-4C (CXCR4)			U. PA
FP21399			Fuji Pharmaceuticals
PRO 542 (gp120)	CD4IgG2		Progenics Pharmaceuticals
PRO-140 (CCR5)	MAb CCR5		Progenics Pharmaceuticals
T-22 (CXCR4)	(peptide, 18-mer)		
Met-SDF-1 (CXCR4)			
TAK 779 (CCR5 antagonist)			Takeda
AOP-Rantes (CCR5)			Gryphon Sciences

Table 4 (Panel 2)

Rantes 9-68 (CCR5)			
CCR5 antagonists	4-(piperidin-1-yl) butane class		Merck
α-Immunokine-NNS03 (CCR5, CXCR4)	α-cobratoxin		PhyloMed Corp.
Integrase Inhibitors			
AR-177	Zintevir		Aronex Pharmaceuticals
Diketo acids			Merck Research Laboratories
Nucleocapsid Inhibitors			
RB 2121	cyclic peptide p7 mimic		(see PNAS 96:4886-4891 (1999))
CI-1012			Achelion Pharmaceuticals
RNase H Inhibitor			
SP1093V (BBNH Fe+3 derivative)			(Parniak)

FDA approved drugs are shown in boldface, red = discontinued development, blue = not sure about development status

6/4/1

Table 4 (Panel 3)

Generic Name (abbreviation)	Brand Name	Firm	FDA Approval Date
zidovudine, AZT	Retrovir	Glaxo Wellcome	March 87
didanosine, ddl	Videx	Bristol Myers-Squibb	October 91
zalcitabine, ddC	Hivid	Hoffman-La Roche	June 92
stavudine, d4T	Zerit	Bristol Myers-Squibb	June 94
lamivudine, 3TC	Epivir	Glaxo Wellcome	November 95
saquinavir, SQV, hgc	Invirase	Hoffman-La Roche	December 95
saquinavir, SQV, sgc	Fortovase	Hoffman-La Roche	November 97
ritonavir, RTV	Norvir	Abbott Laboratories	March 96
indinavir, IDV	Crixivan	Merck & Co., Inc.	March 96
nevirapine, NVP	Viramune	Boehringer Ingelheim	June 96
nelfinavir, NFV	Viracept	Agouron Pharmaceuticals	March 97
delavirdine, DLV	Rescriptor	Pharmacia & Upjohn	April 97
ZDV+3TC	Combivir	Glaxo Wellcome	September 97
efavirenz, EFV	Sustiva	DuPont Pharmaceuticals	September 98
abacavir, ABC	Ziagen	Glaxo Wellcome	February 99
amprenavir	Agenerase	Glaxo Wellcome	April 99
lopinavir/ritonavir	Kaletra	Abbott	September 2000
ZDV+3TC+ABC	Trizivir	GlaxoSmithKline	November 2000

CORECEPTOR ASSAY SCREEN TEMPLATE

active RLU limit: 100   tropism ratio limit: 5   CXCR4   CCR5   DUAL ▇▇▇▇

drug 1: L83
drug 2: AMD

Wells 1–6

	1 R5	1 X4	1 R5:X4	2 R5	2 X4	2 R5:X4	3 R5	3 X4	3 R5:X4	4 R5	4 X4	4 R5:X4	5 R5	5 X4	5 R5:X4	6 R5	6 X4	6 R5:X4
No Drug RLU	34	26,471	0.00	14,140	55	257.09	46	6,849	0.01	21,656	38,144	0.57	30	7,336	0.00	3,988	31	128.65
L83 RLU		19,258			54			4,696		27	25,542			5,468		34		
AMD RLU		32			12,186			40		7,226	32			39		3,664		

Wells 13–18

	13 R5	13 X4	13 R5:X4	14 R5	14 X4	14 R5:X4	15 R5	15 X4	15 R5:X4	16 R5	16 X4	16 R5:X4	17 R5	17 X4	17 R5:X4	18 R5	18 X4	18 R5:X4
No Drug RLU	4,552	19,102	0.24	149	226	0.66	67,389	72	935.96	611	19,715	0.03	46	3,948	0.01	284	4,330	0.07
L83 RLU	28	9,956		40	153		99			30	14,985			2,953		38	2,918	
AMD RLU	838	34		41	24		42,295			76	1,022			152		25	48	

Wells 25–30

	25 R5	25 X4	25 R5:X4	26 R5	26 X4	26 R5:X4	27 R5	27 X4	27 R5:X4	28 R5	28 X4	28 R5:X4	29 R5	29 X4	29 R5:X4	30 R5	30 X4	30 R5:X4
No Drug RLU	67,828	68	997.47	14,982	12,020	1.25	3,788	4,384	0.86	50	37	▇▇	658	242	2.72	231	35	6.60
L83 RLU	129			111	10,839		59	3,397					32	221		47		
AMD RLU	51,146			8,580	3,384		2,049	538					493	38		219		

Wells 37–42

	37 R5	37 X4	37 R5:X4	38 R5	38 X4	38 R5:X4	39 R5	39 X4	39 R5:X4	40 R5	40 X4	40 R5:X4	41 R5	41 X4	41 R5:X4	42 R5	42 X4	42 R5:X4
No Drug RLU	100	39	▇▇	3,724	2,310	1.61	450	668	0.67	148	24	6.17	32	22	▇▇	60	61	▇▇
L83 RLU				38	2,656		37	463		33								
AMD RLU				1,984	272		206	72		139								

Wells 49–54

	49 R5	49 X4	49 R5:X4	50 R5	50 X4	50 R5:X4	51 R5	51 X4	51 R5:X4	52 R5	52 X4	52 R5:X4	53 R5	53 X4	53 R5:X4	54 R5	54 X4	54 R5:X4
No Drug RLU	35	107	0.33	83	4,209	0.02	18,099	8,451	2.14	39,257	38	1033.08	5,413	40	135.33	97,733	29	3370.10
L83 RLU		68			3,502		13,896	6,220		85			35			30		
AMD RLU		34			88		16,980	8,711		27,832			5,043			48,452		

Wells 61–66

	61 R5	61 X4	61 R5:X4	62 R5	62 X4	62 R5:X4	63 R5	63 X4	63 R5:X4	64 R5	64 X4	64 R5:X4	65 R5	65 X4	65 R5:X4	66 R5	66 X4	66 R5:X4
No Drug RLU	3,769	40	94.23	786	48	16.38	340	21	16.19	5,189	43	120.67	4,318	37	116.70	196	51	3.84
L83 RLU	29			39			31			34			28			23		
AMD RLU	2,773			797			282			5,356			3,461			184		

Wells 73–78

	73 R5	73 X4	73 R5:X4	74 R5	74 X4	74 R5:X4	75 R5	75 X4	75 R5:X4	76 R5	76 X4	76 R5:X4	77 R5	77 X4	77 R5:X4	78 R5	78 X4	78 R5:X4
No Drug RLU	391	26	15.04	98	38	▇▇	4,449	28	158.89	4,357	9,102	0.48	6,090	105	58.00	1,886	3,635	0.52
L83 RLU	50						43			34	7,932		73	77		38	2,092	
AMD RLU	340						3,752			906	36		4,473	51		279	27	

Wells 85–90

	85 R5	85 X4	85 R5:X4	86 R5	86 X4	86 R5:X4	87 R5	87 X4	87 R5:X4	88 R5	88 X4	88 R5:X4	89 R5	89 X4	89 R5:X4	90 R5	90 X4	90 R5:X4
No Drug RLU	510	33	15.45	979	59	16.59	491	33	14.88	300	3,815	0.08	297	3,615	0.08	39	61,594	0.00
L83 RLU	42			55			49			29	3,661		32	2,946			56,739	
AMD RLU	564			813			376			268	36		256	30			40	

Wells 7–12

	7 R5	7 X4	7 R5:X4	8 R5	8 X4	8 R5:X4	9 R5	9 X4	9 R5:X4	10 R5	10 X4	10 R5:X4	11 R5	11 X4	11 R5:X4	12 R5	12 X4	12 R5:X4
No Drug RLU	30	1,217	0.02	49	1,128	0.04	42,206	70	602.94	45	1,159	0.04	44,589	97	459.68	32	29,118	0.00
L83 RLU		814			934		90				761		60				22,279	
AMD RLU		42			37		33,192				33		30,510				31	

Wells 19–24

	19 R5	19 X4	19 R5:X4	20 R5	20 X4	20 R5:X4	21 R5	21 X4	21 R5:X4	22 R5	22 X4	22 R5:X4	23 R5	23 X4	23 R5:X4	24 R5	24 X4	24 R5:X4
No Drug RLU	100	5,204	0.02	11,299	52	217.29	1,273	20	63.65	7,375	10,856	0.68	4,397	7,130	0.62	16,115	50	322.30
L83 RLU		3,058		22			26			40	6,455		42	3,874		68		
AMD RLU		34		8,232			1,129			3,961	2,283		1,656	1,285		11,980		

Wells 31–36

	31 R5	31 X4	31 R5:X4	32 R5	32 X4	32 R5:X4	33 R5	33 X4	33 R5:X4	34 R5	34 X4	34 R5:X4	35 R5	35 X4	35 R5:X4	36 R5	36 X4	36 R5:X4
No Drug RLU	53	974	0.05	177	32	5.53	24,739	33	749.67	612	45	13.60	2,997	9,695	0.31	416	31	13.42
L83 RLU		828		32			31			48			22	7,261		28		
AMD RLU		95		361			21,767			479			925	35		597		

Wells 43–48

	43 R5	43 X4	43 R5:X4	44 R5	44 X4	44 R5:X4	45 R5	45 X4	45 R5:X4	46 R5	46 X4	46 R5:X4	47 R5	47 X4	47 R5:X4	48 R5	48 X4	48 R5:X4
No Drug RLU	45	338	0.13	714	45	15.87	11,029	18	612.72	2,908	43	67.63	13,997	52	269.17	24,377	34	716.97
L83 RLU		207		31			18			31			73			59		
AMD RLU		29		366			8,390			2,306			12,139			16,045		

Wells 55–60

	55 R5	55 X4	55 R5:X4	56 R5	56 X4	56 R5:X4	57 R5	57 X4	57 R5:X4	58 R5	58 X4	58 R5:X4	59 R5	59 X4	59 R5:X4	60 R5	60 X4	60 R5:X4
No Drug RLU	9,254	23,846	0.39	5,249	20,393	0.26	470	39	12.05	19,175	126	152.18	513	31	16.55	3,264	28	116.57
L83 RLU	43	9,150		38	8,290		37			96	183		35			30		
AMD RLU	2,219	40		784	38		310			19,638	35		500			3,038		

Wells 67–72

	67 R5	67 X4	67 R5:X4	68 R5	68 X4	68 R5:X4	69 R5	69 X4	69 R5:X4	70 R5	70 X4	70 R5:X4	71 R5	71 X4	71 R5:X4	72 R5	72 X4	72 R5:X4
No Drug RLU	3,853	77	50.04	411	34	12.09	7,857	41	191.63	25,437	38	669.39	17,443	45	387.62	16,707	38	439.66
L83 RLU	39			22			42			35			40			104		
AMD RLU	2,108			253			4,595			14,749			13,708			12,486		

Wells 79–84

	79 R5	79 X4	79 R5:X4	80 R5	80 X4	80 R5:X4	81 R5	81 X4	81 R5:X4	82 R5	82 X4	82 R5:X4	83 R5	83 X4	83 R5:X4	84 R5	84 X4	84 R5:X4
No Drug RLU	263	38	6.92	3,890	9,577	0.41	2,089	1,698	1.23	475	43	11.05	8,475	38	223.03	4,107	33	124.45
L83 RLU	33			44	6,140		33	1,224		30			30			28		
AMD RLU	143			986	45		1,105	160		159			6,862			2,571		

Wells 91–96

	91 R5	91 X4	91 R5:X4	92 R5	92 X4	92 R5:X4	93 R5	93 X4	93 R5:X4	94 R5	94 X4	94 R5:X4	95 R5	95 X4	95 R5:X4	96 R5	96 X4	96 R5:X4
No Drug RLU	443	13,452	0.03	34	128,238	0.00	22	62	▇▇	45	33	▇▇	43	42	▇▇	46	35	▇▇
L83 RLU	33	12,051			85,018													
AMD RLU	451	51			45													

Table 4B

3	R5 cells	X4 cells	R5:X4
no drug			
R5 inhibitor			
X4 inhibitor			
%inhib by R5 inhibitor			
%inhib by X4 inhibitor			

21	R5	X4	R5:X4
no drug			
R5 inhibitor			
X4 inhibitor			
%inhib by R5 inhibitor			
%inhib by X4 inhibitor			

76	R5	X4	R5:X4
no drug	14,982	12,020	1
R5 inhibitor	111	10,839	
X4 inhibitor	8,580	3,384	
%inhib by R5 inhibitor	99	10	
%inhib by X4 inhibitor	43	72	

95	R5	X4	R5:X4
no drug	43	42	
R5 inhibitor			
X4 inhibitor			
%inhib by R5 inhibitor			
%inhib by X4 inhibitor			

DUAL or MIXED
DEAD

Plate	Repeat	End time	Start temp.	End temp.	BarCode
1	1	6:39:36 PM	21.6	21.7	N/A

0.5 CPS (CPS)
18

```
26648    54   6970  37406   7158     38   1386    930    100   1184    112  30488
19248   262     72  18972   3478   3946   5010     46     14  11004   7474     60
  106  9038   4002     32    238     26    976     34     38     48   9736     32
   38  2000    528     16     16     36    298     52     14     54     52     38
  122  2984   7264     40     38     20  23344  15340     44    156     40     32
   36    52     28     40     28     40     62     32     28     38     22     44     28
   22    32     28   9858     68   3802     46  11470   1958     42     42     24
   30    64     36   3846   3390  57858  12620 126186     68     34     38     36
```

Plate	Repeat	End time	Start temp.	End temp.	BarCode
2	1	6:41:51 PM	21.5	21.6	N/A

0.5 CPS (CPS)
34

```
26294    56   6728  38882   7514     24   1048   1326     40   1134     82  27748
18956   190     72  20458   4418   4714   5398     58     26  10708   6786     40
   30 15002   4766     42    246     44    972     30     28     42   9654     30
   40  2620    808     32     28     86    378     38     22     32     52     30
   92  5434   9638     36     42     38  24348  25446     34     96     22     24
   44    44     14     46     46     62     92     36     44     54     46     48
   30    44     28   8346    142   3468     30   7684   1438     44     34     42
   36    54     30   3784   3840  65330  14284 130290     56     32     46     34
```

Plate	Repeat	End time	Start temp.	End temp.	BarCode
3	1	6:44:06 PM	21.6	21.6	N/A

0.5 CPS (CPS)
16

```
18590    18   4306  23902   5386     30    924    894     32    660     48  23382
 8698   148     34  14088   2880   3142   3160     40     46   7616   2842     32
   30 10252   3542     38    172     34    842     30     32     44   7616     34
   28  2396    370     28     26     66    172     32     22     28     36     26
   64  3784   4822     32     28     24   6188   5702     34    120     34     24
   16    28     62     26     28     30     38     38     38     44     62     34
   38    52     40   7020     68   1798     62   7324   1076     50     42     32
   32    50     70   3824   3138  53670  13088 104608     32     38     50     32
```

Plate	Repeat	End time	Start temp.	End temp.	BarCode
4	1	6:46:20 PM	21.7	21.8	N/A

0.5 CPS (CPS)
24

```
19926    46   5086  27182   5550     26    704    974     32    862     44  21176
11214   158     42  15882   3026   2694   2956     26     20   5294   4906     44
   56 11426   3252     82    270     52    814     36     40     64   6906     32
   32  2916    556     42     30     64    242     38     24     36     42     40
   72  3220   7618     36     38     44  12112  10878     32    246     32     42
   32    48     22     30     28     24    136     30     56     34     24     24
   32    38     40   8844     86   2386     54   4956   1372     50     46     28
   22    34     40   3498   2754  59808  11014  65428     34     40     24     18
```

Plate	Repeat	End time	Start temp.	End temp.	BarCode
5	1	6:48:35 PM	21.9	21.9	N/A

0.5 CPS (CPS)
38

```
   38    28     40     30     38    234     46     30     46     30     34     22
   26    20     32    976    190     58     46     24     28   2298   1290     26
   42  3260    420     50     36     34    102     26     34     24     40     24
   28   378     88     32     34     32     40     42     54     26     30     48
   36    62  11690     38     44     32     42     42     26     36     46     42
   46    22     44     38     58     32     38     30     32     36     38     12
   22    38     52     40     42     26     34     50    200     36     34     36
   36    80     52     40     36     40     52     54     22     40     42     36
```

Plate	Repeat	End time	Start temp.	End temp.	BarCode
6	1	6:50:50 PM	21.8	21.9	N/A

0.5 CPS (CPS)
30

```
   26    28     40     34     40     50     38     44     34     36     40     40
   42    28     32   1068    114     38     22     46     30   2268   1280     40
   36  3508    656     48     40     34     88     30     34     56     30     36
   28   166     56     28     18     40     18     38     32     34     26     32
   32   114   5732     32     42     34     38     34     50     34     38     52
   36    22     36     40     30     20     30     26     42     40     26     36
   46    24     26     32     60     28     32     40    120     36     20     36
   32    58     58     32     24     40     50     36     12     38     40     18
```

Plate | Repeat | End time | Start temp. | End temp. | BarCode
1 | 1 | ######## | 21.7 | 21.8 | N/A

0.5 CPS (CPS)
32

24	14218	56	21586	28	4034	36	52	42088	40	43332	38
4780	174	71276	730	48	326	28	12022	1288	7198	4314	17856
69452	15306	4008	44	792	180	50	182	25292	718	3572	424
72	3922	546	128	44	66	30	900	11984	3194	16106	23794
30	88	18820	40438	4882	105946	8466	4934	470	20386	548	3376
3420	934	344	6268	5012	170	3546	504	8164	22214	15146	19592
344	82	5344	5330	6710	1880	338	4286	2112	466	7752	4078
580	1018	516	318	302	40	414	32	20	52	48	42

Plate | Repeat | End time | Start temp. | End temp. | BarCode
2 | 1 | ######## | 21.9 | 21.9 | N/A

0.5 CPS (CPS)
22

44	14062	36	21726	32	3942	24	46	42324	50	45846	26
4324	124	63502	492	44	242	172	10576	1258	7552	4480	14374
66204	14658	3568	56	524	282	56	172	24186	506	2422	408
128	3526	354	168	20	54	60	528	10074	2622	11888	24960
40	78	17378	38076	5944	89520	10042	5564	470	17964	478	3152
4118	638	336	4110	3624	222	4160	318	7550	28660	19740	13822
438	114	3554	3384	5470	1892	188	3494	2066	484	9198	4136
440	940	466	282	292	38	472	36	24	38	38	50

Plate | Repeat | End time | Start temp. | End temp. | BarCode
3 | 1 | ######## | 21.9 | 22 | N/A

0.5 CPS (CPS)
36

36	38	28	28	38	28	36	42	114	40	60	46
32	34	80	26	16	36	30	18	26	30	48	80
126	106	34	42	30	46	22	26	32	58	8	28
26	46	42	38	34	20	18	34	24	36	100	60
28	146	15756	76	32	26	42	52	36	106	34	24
34	50	20	24	32	18	38	18	36	38	50	58
38	38	28	36	80	50	38	44	34	38	30	28
40	30	38	30	24	22	38	36	34	36	22	26

Plate | Repeat | End time | Start temp. | End temp. | BarCode
4 | 1 | ######## | 21.9 | 22 | N/A

0.5 CPS (CPS)
16

24	70	30	26	26	40	18	32	66	30	60	34
24	46	118	34	26	40	34	26	26	50	36	56
132	116	84	34	34	48	34	38	30	38	36	28
32	30	32	28	26	40	46	28	12	26	46	58
34	84	12036	94	38	34	44	24	38	86	36	36
24	28	42	44	24	28	40	26	48	32	30	150
62	24	58	32	66	26	28	44	32	22	30	28
44	80	60	28	40	28	28	34	32	36	18	28

Plate | Repeat | End time | Start temp. | End temp. | BarCode
5 | 1 | ######## | 22 | 22 | N/A

0.5 CPS (CPS)
34

38	11132	26	6696	34	3960	44	40	29548	40	30628	34
762	48	39888	88	40	30	36	8416	1262	4096	1598	12372
52058	8050	2524	60	450	168	32	340	22410	534	1046	512
106	2080	172	170	38	38	30	444	7478	2458	10024	15470
30	46	16428	25792	4240	45094	2092	630	334	17130	388	2730
2498	732	358	5044	3236	202	2124	292	4806	13736	13012	12386
290	30	3986	886	4584	240	110	940	1286	162	6768	2204
456	816	438	294	260	44	524	40	34	22	38	20

Plate | Repeat | End time | Start temp. | End temp. | BarCode
6 | 1 | ######## | 22 | 22.1 | N/A

0.5 CPS (CPS)
32

40	13240	38	7756	38	3368	24	40	36836	48	30392	36
914	34	44702	64	50	20	24	8048	996	3826	1714	11588
50234	9110	1574	46	536	270	20	382	21124	424	804	682
200	1888	240	108	28	46	30	288	9302	2154	14254	16620
46	28	17532	29872	5846	51810	2346	938	286	22146	612	3346
3048	862	206	5668	3686	166	2092	214	4384	15762	14404	12586
390	64	3518	926	4362	318	176	1032	924	156	6956	2938
672	810	314	242	252	26	378	30	20	34	50	38

R5
No Drug

X4
No Drug

L83

AMD

Table 6

T20 Resistance Mutations

SDM Virus	T20 Sens.[a]	T20 FC[b]
HXB2 G I V		1.0
NL4-3 G I V	S	5.2
NL4-3 D I V	S	12.8
NL4-3 G I M	S	33.0
NL4-3 S I V	S	74.2
NL4-3 D I M	R	113.0
NL4-3 S I M	R	227.4
NL4-3 D T V	R	>281.8
JRCSF G I V		2.1
JRCSF D I V		104.0

[a] Rimsky et al., J. Virol. 72(2):986-993

[b] Fold change in IC50 (vs. HXB2) using PhenoSense HIV Entry Assay

T20 Resistance Mutations

SDM Virus	T20 Sens.[a]	T20 FC[b]
HXB2 G I V		1.0
NL4-3 G I V	S	5.2
NL4-3 D I V	S	12.8
NL4-3 G I M	S	33.0
NL4-3 S I V	S	74.2
NL4-3 D I M	R	113.0
NL4-3 S I M	R	227.4
NL4-3 D T V	R	>281.8
JRCSF G I V		2.1
JRCSF D I V		104.0

[a] Rimsky et al., J. Virol. 72(2):986-993
[b] Fold change in IC50 (vs. HXB2) using PhenoSense HIV Entry Assay

Table 6

Entry Inhibitor Susceptibility: T-20 Fusion Inhibitor

Drug resistance mutations were introduced into well-characterized X4 tropic (NL4-3) and R5 tropic (JRCSF) viruses. T20 susceptibility was measured using the virus entry assay. The fold change (FC) in T-20 susceptibility for each virus was determined by dividing the IC50 of the test virus by the IC50 of the HXB2 strain of HIV-1. T-20 sensitivity of similar mutant viruses has been reported in the scientific literature (Rimsky et al.,).

Table 7

Identifying Entry Inhibitor Resistance Mutations

Virus	AA Sequence[a]											
HXB2	Q	L	L	S	G	I	V	Q	Q	Q		
1	Q	L	L	S	G	I	V	Q	Q	Q		
2	Q	L	L	S		I		Q	Q	Q		
3	Q	L	L	S	X	I	X	Q	Q	Q	X=G/S	X=V/M
4	Q	L	L	S	G	I	V	Q	Q	Q		
5	Q	L	L	S	G	H	V	Q	Q	Q		
6	Q	L	L	S	X	I	X	Q	Q	Q	X=G/S	X=V/M
7	Q	L	L	S	G	I	V	Q	Q	Q		
8	Q	L	L	S	G	H	V	Q	Q	Q		
9	Q	L	L	S	G	I	V	Q	Q	Q		
10	Q	L	L	S		H	I	V	Q	Q	Q	
12	Q	L	L	S	X	I	V	Q	Q	Q	X=G/D	
13	Q	L	L	S	G	I	V	Q	Q	Q		

[a] gp41 amino acid sequence positions 32 to 41

Identifying Entry Inhibitor Resistance Mutations

Virus	AA Sequence[a]											
HXB2	Q	L	L	S	G	I	V	Q	Q	Q		
1	Q	L	L	S	G	I	V	Q	Q	Q		
2	Q	L	L	S	S	I	M	Q	Q	Q		
3	Q	L	L	S	X	I	X	Q	Q	Q	X=G/S	X=V/M
4	Q	L	L	S	G	I	V	Q	Q	Q		
5	Q	L	L	S	G	I	V	Q	Q	Q		
6	Q	L	L	S	X	I	X	Q	Q	Q	X=G/S	X=V/M
7	Q	L	L	S	G	I	V	Q	Q	Q		
8	Q	L	L	S	G	I	V	Q	Q	Q		
9	Q	L	L	S	G	I	V	Q	Q	Q		
10	Q	L	L	S	D	I	V	Q	Q	Q		
12	Q	L	L	S	X	I	V	Q	Q	Q	X=G/D	
13	Q	L	L	S	G	I	V	Q	Q	Q		

[a] gp41 amino acid sequence positions 32 to 41

Table 7

Identifying Envelope Protein Mutations.

Viruses with reduced (or increased) susceptibility to an entry inhibitor are identified using the virus entry assay. Mutations that may confer reduced (or increased) susceptibility to the entry inhibitor are identified by sequencing the envelope genes of the sensitive and resistant viruses. The deduced amino acid sequences of the sensitive and resistant viruses are compared to identify candidate drug resistance mutations. The ability of a specific mutation to confer altered drug susceptibility is confirmed or disproved by introducing the mutation into a drug sensitive virus and measuring the susceptibility of the mutant virus in the virus entry assay. In the example represented here, a short stretch of amino acid sequences within the first heptad repeat (HR-1) of the HIV-1 gp41 transmembrane envelope protein is aligned for viruses exhibiting different T-20 susceptibilities. Highlighted amino acids represent mutations known to confer reduced susceptibility to T-20.

Similar analyses can be used to identify envelope amino acid sequences that (a) alter/influence susceptibility to CCR5 or CXCR4 inhibitors, (b) specify X4, R5 and dual tropism, and © elicit neutralizing antibodies.